Supplementary material for Beyond Large Shaped Tools: Technological innovations and continuities at the late Early Pleistocene assemblage of Barranc de la Boella (Tarragona, Spain).

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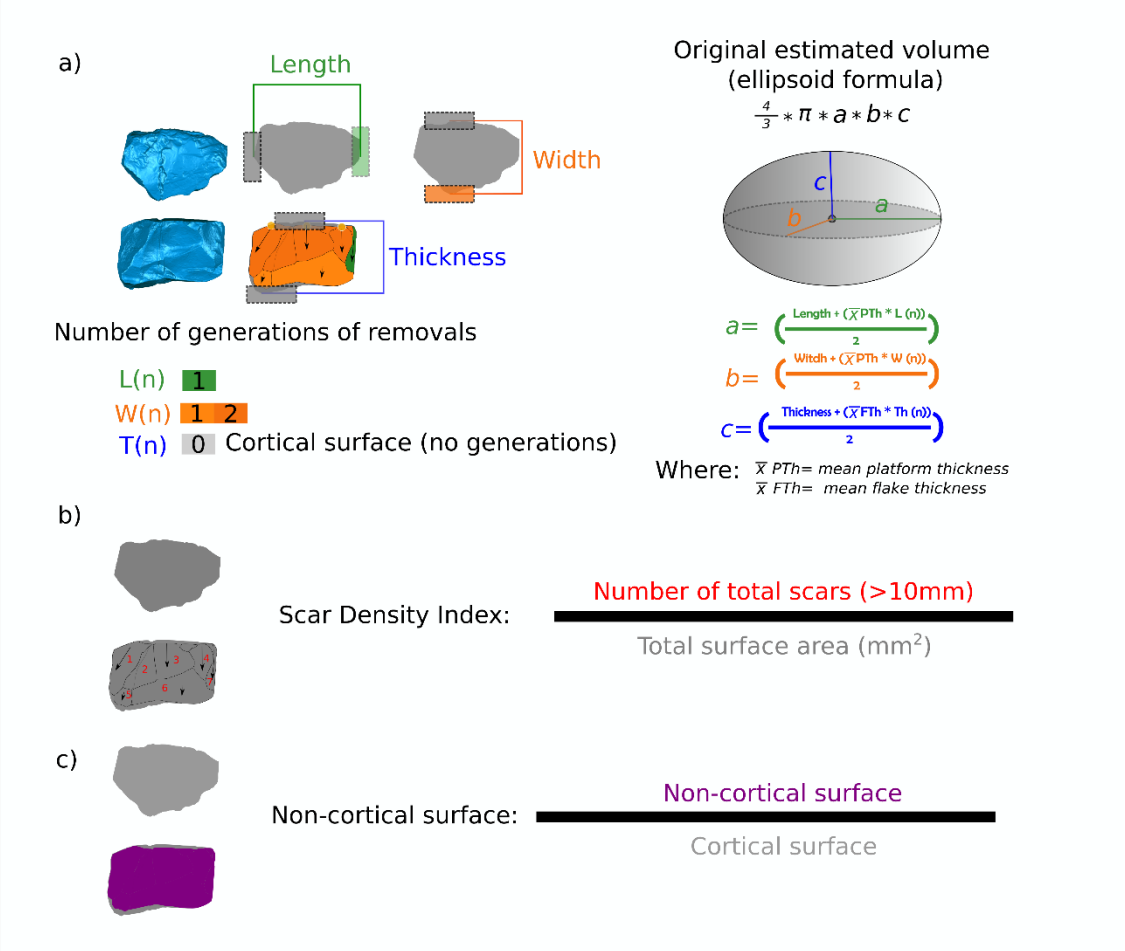

Supplementary Figure S1. A) Original Estimated Volume calculation through Volumetric Reconstruction Method. B) Scar Density Index calculation, C) Non-cortical surface calculation.

Supplementary Information: R Packages

- **Dplyr (v.1.1.4):** A package for data manipulation and transformation. It provides a grammar of data manipulation, allowing users to easily filter, select, arrange, and summarize data. It's particularly useful for tasks such as data cleaning, wrangling, and summarization.

  Reference: Wickham, H., François, R., Henry, L., & Müller, K. (2021). dplyr: A Grammar of Data Manipulation. R package version 1.0.7. Retrieved from https://CRAN.R-project.org/package=dplyr

- **knitr (v.1.45):** It allows embedding R code into documents, such as R Markdown, Markdown, HTML, LaTeX, and more, to create reproducible research and dynamic reports with ease.

  Reference: Xie, Y. et al. (2021). knitr: A General-Purpose Package for Dynamic Report Generation in R. R package version 1.36. Retrieved from https://CRAN.R-project.org/package=knitr

- **readr (v.2.1.5):** A package designed to facilitate the reading of .csv files. It provides simple functions to import data from .csv worksheets into R data frames, preserving column types and data structure.

  Reference: Hadley Wickham and Jim Hester (2022). readr: Read Rectangular Text Data. R package version 2.1.5. https://CRAN.R-project.org/package=readr

- **stats (v.4.2.2):** This package provides essential statistical functions and distributions for data analysis. It includes functions for basic statistical operations, probability distributions, hypothesis testing, and more. Detailed information about stats can be found in the R documentation.

- **ggplot2 (v.3.5.1):** A versatile package for creating customizable visualizations in R. It follows the Grammar of Graphics framework, enabling users to build complex plots by layering aesthetic mappings onto data. With ggplot2, users can effortlessly create a wide range of plots including scatter plots, histograms, bar plots, line plots, and more. ggplot2 is widely used in data analysis, exploratory data visualization, and presentation of findings.

  Reference: Wickham, H. (2016). ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York. Retrieved from https://ggplot2.tidyverse.org

- **tidyr (v.1.3.1):** This package provides straightforward tools for reshaping and restructuring data into a tidy format where each variable is a column, each observation is a row, and each type of observational unit forms a table.

  Reference: Wickham H, Vaughan D, Girlich M (2024). tidyr: Tidy Messy Data. R package version 1.3.1, https://github.com/tidyverse/tidyr, https://tidyr.tidyverse.org

- **stringr (v. 1.5.1):** stringr is a package for working with text strings in R, providing a series of simple and consistent functions for text manipulation.

  Reference: Wickham H (2023). _stringr: Simple, Consistent Wrappers for Common String Operations_. R package version 1.5.1, https://CRAN.R-project.org/package=stringr

Category	Blank type	EF	LM	P1	Total
Core	**All types**	**8 (61.54%)**	**15 (60%)**	**24 (68.57%)**	**47 (64.38%)**
	Cobble	1 (12.50%)	2 (13.33%)	2 (8.33%)	5 (10.64%)
	Flake	0 (0%)	0 (0%)	4 (16.67%)	4 (8.51%)
	Fragment	0 (0%)	0 (0%)	4 (16.67%)	4 (8.51%)
	Indet	1 (12.50%)	1 (6.67%)	1 (4.17%)	3 (6.38%)
	Nodule	6 (75%)	12 (80%)	13 (54.17%)	31 (65.96%)
Large shaped tools	**All types**	**5 (38.46%)**	**10 (40%)**	**11 (31.43%)**	**26 (35.62%)**
	Cobble	4 (80%)	9 (90%)	7 (63.64%)	20 (76.92%)
	Flake	1 (20%)	0 (0%)	3 (27.27%)	4 (15.38%)
	Nodule	0 (0%)	1 (10%)	0 (0%)	1 (3.85%)
	Slab	0 (0%)	0 (0%)	1 (9.09%)	1 (3.85%)
Total	**Total**	**13 (100%)**	**25 (100%)**	**35 (100%)**	**73 (100%)**

Supplementary Table S1. Frequency of blank types for cores and large shaped tools in each BB locality. EF= El Forn, LM= La Mina, P1= Pit 1.

Category	Blank type	Sample Size	Mean	Median	Min	Max	SD	CV	Shapiro-Wilk (p)
Core	**All types**	24	138.126	42.675	4.630	609.261	177.478	128	<0.0001
	Cobble	11	605.132	605.132	601.003	609.261	5.840	0.97	NA
	Flake	2	58.328	41.564	16.414	133.771	55.277	94.8	0.25
	Fragment	4	50.503	20.218	4.630	156.947	71.344	141	0.01
	Indet	4	11.395	11.395	11.395	11.395	NA	NA	NA
	Nodule	13	127.541	56.255	7.660	336.624	125.864	98.7	0.013
Large Shaped Tool	**All types**	11	254.758	245.540	54.835	507.721	118.158	46.4	0.41
	Cobble	7	263.323	247.608	54.835	507.721	151.356	57.5	0.98
	Flake	3	238.574	245.540	216.934	253.246	19.132	8.02	0.38
	Slab	1	243.353	243.353	243.353	243.353	NA	NA	NA

Supplementary Table S2. Summary statistics of Volume (cm^3) by category and blank type at P1.

Category	Blank type	Sample Size	Mean	Median	Min	Max	SD	CV	Shapiro-Wilk (p)
Core	**All types**	15	78.392	27.001	3.283	799.019	200.080	255	<0.0001
	Cobble	12	413.010	413.010	27.001	799.019	545.899	132	NA
	Nodule	2	28.571	29.538	3.283	54.117	18.147	63.5	NA
	Indet	1	7.006	7.006	7.006	7.006	NA	NA	NA
Large Shaped Tool	**All types**	10	275.867	178.087	76.628	888.252	246.812	89.5	0.00507
	Cobble	9	264.890	136.632	76.628	888.252	259.181	97.8	NA
	Nodule	1	374.659	374.659	374.659	374.659	NA	NA	NA

Supplementary Table S3. Summary statistics of Volume (cm^3) by category and blank type at LM.

Category	Blank type	Sample Size	Mean	Median	Min	Max	SD	CV	Shapiro-Wilk (p)
Core	**All types**	8	227.968	73.351	23.622	749.816	296.390	130	0.003
	Cobble	1	645.011	645.011	645.011	645.011	NA	NA	NA
	Nodule	6	192.518	73.351	30.002	749.816	279.895	145	NA
	Indet	1	23.622	23.622	23.622	23.622	NA	NA	NA
Large Shaped Tool	**All types**	5	350.317	225.335	91.883	972.030	361.676	103	0.05
	Cobble	4	351.649	171.341	91.883	972.030	417.614	119	NA
	Flake	1	344.992	344.992	344.992	344.992	NA	NA	NA

Supplementary Table S4. Summary statistics of Volume (cm^3) by category and blank type at EF.

Locality	Raw material	Sample Size	Mean	Median	Min	Max	SD	CV	Shapiro-Wilk (p)
PIT 1	Core	15	240	163	34.3	1023	267	111	0.00153
	Large Shaped Tool	8	382	286	57.8	792	273	71.5	0.256
LA MINA	Core	12	51.597	46.236	23.385	110.821	26.844	52	0.16
	Large Shaped Tool	7	397.042	369.370	115.699	1098.301	333.348	84	0.02
EL FORN	Core	7	261.310	121.496	60.045	1009.779	341.24	131	0.001
	Large Shaped Tool	2	668.947	668.947	274.658	1063.239	557.609	83.4	-

Supplementary Table S5. Summary statistics of Estimated Volume (cm^3) through VRM by category at each locality.

Locality	Raw material	Sample Size	Mean	Median	Min	Max	SD	CV	Shapiro-Wilk (p)
PIT 1	Chert	15	191	163	34.3	502	158	83	0.00349
	Sandstone	1	1023	1023	1023	1023	-	-	-
	Schist	7	396	289	57.8	792	**292**	**73.6**	**0.356**
LA MINA	Chert	14	82.76	52.05	23.38	423.76	102.63	124	0.00017
	Quartzite	1	185.189	185.189	185.189	185.189	-	-	-
	Schist	4	513.659	390.583	175.171	1098.301	403.144	78.5	0.207
EL FORN	Chert	7	261.310	121.496	60.045	1009.779	341.24	131	0.001
	Schist	2	668.947	668.947	274.658	1063.239	557.609	83.4	-

Supplementary Table S6. Summary statistics of Estimated Volume (cm^3) through VRM by raw material at each locality.

Flaking surfaces	EF	LM	P1	Total
Unifacial	6 (75.0%)	4 (26.7%)	8 (34.8%)	18 (30.0%)
Bifacial	2 (25.0%)	8 (53.3%)	12 (52.2%)	22 (36.7%)
Trifacial	0 (0%)	0 (0%)	1 (4.3%)	1 (3.3%)
Multifacial	0 (0%)	3 (20.0%)	3 (13.0%)	6 (20.0%)

Supplementary Table S7. Number of flaking surfaces per core in each BB locality. EF= El Forn, LM= La Mina, P1= Pit 1.

Percussion surfaces	EF	LM	P1	Total
Unipolar	3 (37.5%)	2 (13.3%)	6 (26.1%)	11 (33.3%)
Bipolar	4 (50.0%)	6 (40.0%)	10 (43.5%)	20 (33.3%)
Multipolar	1 (12.5%)	7 (46.7%)	7 (30.4%)	15 (33.3%)

Supplementary Table S8. Number of percussion surfaces per core in each BB locality. EF= El Forn, LM= La Mina, P1= Pit 1.

Orientation of removals	EF	LM	P1	Total
Centripetal	0 (0%)	1 (6.7%)	3 (13.0%)	4 (6.7%)
Longitudinal	3 (37.5%)	2 (13.3%)	7 (30.4%)	12 (20.0%)
Opposite	2 (25.0%)	3 (20.0%)	2 (8.7%)	7 (11.7%)
Orthogonal	3 (37.5%)	9 (60.0%)	11 (47.8%)	23 (38.3%)

Supplementary Table S9. Orientation of removals per core in each BB locality. EF= El Forn, LM= La Mina, P1= Pit 1.

Prepared percussion surfaces	EF	LM	P1	Total
Prepared platform	2 (25.0%)	3 (20.0%)	9 (37.5%)	14 (29.8%)
Un-prepared platform	6 (75.0%)	12 (80.0%)	15 (62.5%)	33 (70.2%)

Supplementary Table S10. Number of prepared percussion surfaces per core in each BB locality. EF= El Forn, LM= La Mina, P1= Pit 1.

Locality	Category	Sample Size	Mean	Median	Min	Max	SD	CV	Shapiro-Wilk (p)
PIT 1	Core	15	45.6	40.5	18.4	77.6	19.5	42.7	0.328
	Large Shaped Tool	8	21.8	14.1	5.21	53.8	17.1	78.4	0.143
LA MINA	Core	12	53.5	47.8	21.6	86	23.1	43.2	0.21
	Large Shaped Tool	7	34.5	33.1	11.6	71.1	19.7	57	0.56
EL FORN	Core	7	48.5	49.1	25.7	72.8	15.2	31.3	0.001
	Large Shaped Tool	2	13.3	13.3	8.58	18	6.63	50	-

Supplementary Table S11. Summary statistics of Percentage of Extracted Volume (%) by category at each locality.

Locality	Category	Sample Size	Mean	Median	Min	Max	SD	CV	Shapiro-Wilk (p)
PIT 1	Core	24	0.12	0.067	0.00932	0.591	0.139	116	0.0001
	Large Shaped Tool	10	0.0305	0.0291	0.0109	0.0656	0.0161	52.7	0.350
LA MINA	Core	15	0.184	0.119	0.00939	0.501	0.182	98.9	0.00152
	Large Shaped Tool	10	0.0279	0.0193	0.00331	0.0707	0.0198	71	0.225
EL FORN	Core	8	0.065	0.052	0.007	0.157	0.0532	81.4	0.455
	Large Shaped Tool	5	0.0183	0.0148	0.006	0.0391	0.0124	67.7	0.12

Supplementary Table S12. Summary statistics of Scar Density Index (SDI) by category at each locality.

Locality	Category	Sample Size	Mean	Median	Min	Max	SD	CV	Shapiro-Wilk (p)
PIT 1	Core	24	71.5	73.6	14.5	100	22.8	31.9	0.16
	Large Shaped Tool	11	57.1	69.5	7.52	94	27.6	48.3	0.57
LA MINA	Core	15	58.9	51.6	22.2	100	29.2	49.6	0.07
	Large Shaped Tool	10	39.5	33.9	11.5	89.3	21.4	54.1	0.03
EL FORN	Core	8	52.7	54.4	15.3	100	26.7	50.7	0.87
	Large Shaped Tool	5	77.8	76.2	68.5	92.3	8.84	11.4	0.35

Supplementary Table S13. Summary statistics of Percentage of non-cortical surface (%) by category at each locality.

Locality	Category	Sample Size	Mean	Median	Min	Max	SD	CV	Shapiro-Wilk (p)
P1	Core	24	0.631	0.736	0.171	0.961	0.240	38.1	0.0959
	Large Shaped Tool	11	0.583	0.475	0.271	0.997	0.268	46	0.131
LM	Core	15	0.620	0.670	0.314	0.959	0.206	33.2	0.373
	Large Shaped Tool	10	0.745	0.759	0.326	0.972	0.207	27.8	0.283
EF	Core	8	0.776	0.765	0.513	0.981	0.185	23.8	0.190
	Large Shaped Tool	5	0.849	0.883	0.657	0.970	0.130	15.3	0.504

Supplementary Table S14. Summary statistics of Scar Pattern Index (SPI) by category at each locality.